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General Notes.

PETROGRAPHY.[1]

Igneous Rocks of St. John, N. B.—W. N. Mathew has continued his work on the igneous rocks of St. John, N. B.,[2] contributing in a recent article an account of the effusive and dyke rocks of the region. All the rocks described are believed to be pre-Cambrian in age. They embrace quartz-porphyries, felsites, porphyries, diabases and feldspar-porphyrites among the effusive rocks, and diorite-porphyrites, diabases and augite-porphyrites among the dyke forms. In some of the quartz-porphyries perlitic cracks may still be recognized, and in the felsite porphyries some spherulites. Tuffs of all the effusives are abundant. A soda granite with augite and green hornblende and probably a little glaucophane was also met with. It is intrusive, and has a composition represented by the figures:

SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	Na_2O	K_2O	CO_2	Loss
64.86	.70	15.02	5.53	1.01	.18	2.61	1.42	3.92	2.37	.55	1.73

[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Trans. N. Y. Acad. Science, XIV, p. 187.

The diorite-porphyrite has a groundmass of idiomorphic hornblende, lathshaped feldspars and some interstitial quartz, with phenocrysts of the same minerals, but principally of feldspar. Among the diabases is a quartzose variety.

Eruptive Rocks from Montana.—Among some specimens of eruptive rocks obtained from Gallatin, Jefferson and Madison Counties, Montana, Merrill[3] finds basalts, andesites, lamprophyres, syenites, porphyrites, wehrlites, harzburgites and websterites, some of which possess peculiar characteristics. A hornblende andesite, for instance, contains large corroded brickred pleochroic apatite crystals, whose color is due to innumerable inclusions scattered through them. The groundmass of some of the basalts has a spherulitic structure. The wehrlite is a holocrystalline aggregate of pale green diallage, reddish brown biotite, colorless olivine and a few patches of plagioclase. Its structure is cataclastic or granulitic, the larger crystals being surrounded by an aggregate of smaller ones. The websterite consists of green diallage and colorless enstatite with included foliae of mica and occasional interstitial areas of feldspar, and is thus related to gabbro. Some of the lamprophyres are composed of groups of polysomatic olivines or of olivine and augite in a scaly granular groundmass of lighter colored minerals, through which are scattered small flakes of brown biotite and tiny augite microlites. This structure is accounted for on the supposition that the granular groups of olivine and of olivine and augite belong to an older series of crystalline products than those of the groundmass.

Porphyrites and the Porphyritic Structure.—In a general account of the laccolitic mountains of Colorado, Utah and Arizona, Cross[4] gives a brief synopsis of the characteristics of the rocks that constitute their cores. These rocks comprise augite, hornblende and hornblende mica-porphyrites, diorites and quartz-porphyrites. All contain phenocrysts of plagioclase and of the iron bearing silicates, with the feldspars largely predominating. These upon separating left for consolidation into the groundmass a magma which upon crystallization yielded a granular aggregate consisting largely of quartz and orthoclase. No pressure effects were seen in any of the sections studied. All are porphyritic with a granular groundmass, which differs in the different rocks, principally in the proportion of its constituents. The porphyritic structure as defined by the author is not the result of the recur-

[3] Proc. U. S. Nat. Museum, XVII, p. 637.

[4] 14th Ann. Rep. U. S. Geol. Survey.

rence of crystallization, producing several generations of crystals, but it is a structure exhibiting contrasts in the size and form of the component crystals of a rock, resulting from the differences in conditions under which the different minerals crystallized.

Granophyre of Carrock Fell, England.—In the Carrock Fell district is a red granophyre closely associated with the gabbros. This rock has recently been studied by Harker,[5] who had previously investigated the gabbros. The normal type of the granophyre is an augitic variety in which the augite occurs as a deep green species which is idiomorphic toward the feldspars. Oligoclase is also present as idiomorphic crystals in a reddish quartz-feldspar groundmass with the typical granophyric structure. The composition of the rocks is represented as follows:

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	Loss	Total
71.60	13.60	2.40	.21	2.30	5.55	3.53	.70	= 99.89

As the rock approaches the gabbro it becomes less acid and the proportion of augite in it increases. This is the lower portion of the mass as it was originally intruded. Its more basic nature as compared with the rest of the rock is explained as due to the absorption of parts of the gabbro with which the granophyre is in contact.

The same author[6] also records the existence of a greisen, which is a phase of the well known Skiddau granite. The greisen consists essentially of quartz and muscovite, but remnants of orthoclose are still to be detected in it. The mica is regarded as having been derived largely from the feldspar.

Sheet and Neck Basalts in the Lausitz.—The basalts of the neighborhood of Seifeirnersdorf and Warnsdorf in the Lausitz, Saxony, occurs in sheets according to Hazard,[7] and in volcanic rocks. The sheet rocks are nepheline basalts, nepheline basanites and feldspathic glass basalts. The neck forms are hornblende basalts, sometimes with and sometimes without nepheline. The constituents of all are magnetite, apatite, augite, biotite, nepheline and glass in varying quantities, with feldspar, olivine and hornblende in different phases. Sometimes the mineral nepheline is absent, but this happens mainly in the glassy varieties, where its components are to be found in the glassy base. There are intermediate varieties between the hornblende and the oli-

[5] Quart. Journ. Geol. Soc., 1895, p. 125.
[6] Ibid, p. 139.
[7] Min. u. Petrog. Mitth., XIV, p. 297.

vine basalts corresponding to geological masses intermediate in characteristics between volcanic sheets and necks. In many of the neck rocks the hornblende is seen to have been partially resorbed and changed to augite. The continuation of the resorbtive process until every trace of the hornblende was dissolved, may account for the absence of the mineral in the sheet rocks.

Petrographical Notes.—In an article whose aim is to call forth more accurate determinations of the feldspars in volcanic rocks, and one which gives a practical method for making this determination, Fouqué[8] has described briefly the volcanic rocks of the Upper Auvergne, the acid volcanics of the Isle of Milo and the most important rocks in the Peleponeses and in Santorin. Among the varieties described are doleritic basalts, andesitic basalts, labradorites, andesites, obsidians, trachyte andesites, phonolites, andesitic diabases, rhyolites, dacites and normal basalts. The labradorites are composed largely of microlites of labradorite with a few augites and tiny crystals of olivine in an altered glassy base. In all these cases the author has shown that the rocks contain several different feldspars at the same time, and in each case he has determined their nature. The method made use of in the determination is based on the observation of extinction angles in plates cut perpendicular to the bisectrices.

In a well written article on complementary rocks and radial dykes Pirsson[9] suggests the name of oxyphyre for the acid complementary rock, corresponding to the term lamprophyre for the basic forms. He also calls attention to the fact that the dykes radiating from eruptive centers are usually filled with younger material than that which composes the core at the center. The dykes cutting the central mass will generally be oxyphyres and the more distant ones lamprophyres.

Cordierite gneisses are reported by Katzer[10] from Deutshbrod and Humpolitz in Bohemia, where they are intruded by granite veins, and where masses of them are occasionally completely surrounded by granitic material.

In the examination of a large series of granites and gneisses from the borders of the White Sea, Federow[11] discovered that garnet is present in large quantities when plagioclase is absent and vice versa.

In a general article on the Catoctin belt in Maryland and Virginia,

[8] Bull. Soc. Franc. d. Min., XVII, p. 429.
[9] Amer. Journ. Sci., 1895, p. 116.
[10] Min. u. Petrog. Mitth., XIV, p. 483.
[11] Ibid, p. 550.

Keith[12] gives very brief descriptions of the granites, quartz porphyries, andesites and the Catoctin schist of the region. The last named rock is apparently a sheared basic volcanic. All the rocks present evidence of having suffered pressure metamorphism.

GEOLOGY AND PALEONTOLOGY.

Notes on the Fossil Mammalia of Europe.—I, COMPARISON OF THE AMERICAN AND EUROPEAN FORMS OF HYRACOTHERIUM.—Historically speaking Hyracotherium is one of the oldest of known fossil Perissodactyla, and it is of importance phylogenetically to compare the representatives of this genus in Europe with those of America, in order to acquire an exact knowledge as to the evolution of the molar cusps of the New and Old World species. My attention was called to this subject on account of having studied *Euprotogonia* of the Puerco, a genus which as well known, is considered to have one of the most primitive types of Ungulate molars.

The importance of having accurate drawings of the teeth of fossil mammals is nowhere better illustrated than in *Hyracotherium*. In the case of the enlarged drawing of the teeth[1] of *H.* (=*Pliolophus*) *vulpiceps* which has been copied extensively in works on vertebrate palæontology, we obtain quite an erroneous idea of the exact form of the molar cusps.

Kowalevsky[2] in his great work on "*Anthracotherium*" figures some of the molars of the type of *Hyracotherium* namely: *H. leporinum*, and I should judge from his description that he had studied Owen's type in London. However, his criticism of Owen's drawing of the type of *Hyracotherium* is very accurate, and as Kowalevsky remarks, Owen's figures gives one the idea that the teeth of the type are strictly bunodont, whereas they are really transitional in structure between a real bunodont type, such as *Euprotogonia* and a truly lophodont form like *Systemodon*.

[12] 14th Ann. Rep. U. S. Geol. Survey, p. 285.

[1] Jour. of the Geog. Soc. of London, 1858, p. 54.

[2] Monographie der Gattung Anthracotherium, p. 205.